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1. □□□□□□□□□□□□□　　□

A. □□ □□□□　　B. □□ □□　　C. □□ □□　　D. □□ □□□

□□□□B

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2. □□□□□□□□□□□□□□□□□　　□

A. □□□□□□□□□□□□□　　B. □□□□□□□□□□□□□□

C. □□□□□□□□□□□□□□□□□　　D. □□□□□□□□□□□□□□□□□□

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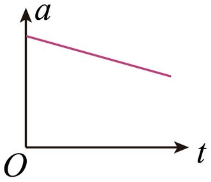
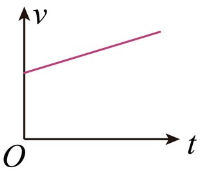
D□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ D □□

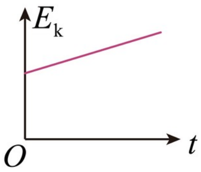
□□ B□

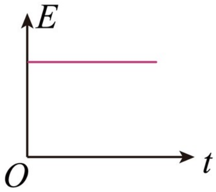
3. [illegible] a[illegible] v[illegible] E_k[illegible] E [illegible] t [illegible]

[illegible]（　　）

A. 

B. 

C. 

D. 

[illegible]D

[illegible]

[illegible]A[illegible] A [illegible]

B[illegible]

$$v_y = gt$$

[illegible]

$$v=\sqrt{v_0^2+(gt)^2}$$

[illegible] B [illegible]

C[illegible]

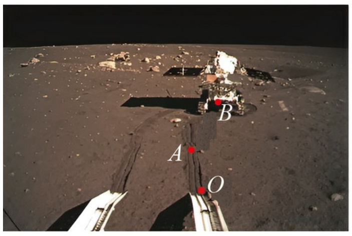
$$E_k=\frac{1}{2}mv^2=\frac{1}{2}m\left[v_0^2+(gt)^2\right]$$

[illegible] C [illegible]

D[illegible] D [illegible]

[illegible] D[illegible]

4. [illegible]“[illegible]”[illegible] O [illegible] B [illegible] OA [illegible]AB [illegible] 135kg[illegible]（　　）



A. [illegible] 1350N

B. [illegible] AB [illegible]

C. OA [illegible] AB [illegible]

D. [illegible] O [illegible] B [illegible] OAB [illegible]

□□□□B

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□□□□A□□□□□□g□□□□□□□□□□135kg□□□□□□□□□□□□□1350N□□A□□□

B□□□□AB□□□□□□□□□□□□□□□□□□□□□□□□□□□B□□□

C□□□□□□□□□□□□□□□□□□□□OA□□AB□□□□□□□□□□□□□□□□□□□□C□□□

D□□□□□□□□□□□O□B□□□□□□□OB□□□□□□□D□□□

□□B□

5. “□□□□”□□□□□□□□□□□□□□□□$^{238}_{94}\mathrm{Pu}$□□□□□□□□□□□□□$^{238}_{94}Pu$□□□□□$^{238}_{94}Pu\to{}^{X}_{92}\mathrm{U}+{}^{4}_{2}He$□□□

□

A. □□□□□□X□□233

B. $^{4}_{2}\mathrm{He}$□□□□□γ□□□

C. $^{238}_{94}Pu$□$^{X}_{92}\mathrm{U}$□□□□□

D. □□□□□□$^{238}_{94}Pu$□□□□□

□□□□C

□□□□

□□□□A□□□□□□□□□□□□□□□□

$$^{238}_{94}\mathrm{Pu}\to{}^{234}_{92}\mathrm{U}+{}^{4}_{2}\mathrm{He}$$

□□□□□□X=234□□A□□□

B□$^{4}_{2}\mathrm{He}$□α□□□□□□□γ□□□□□B□□□

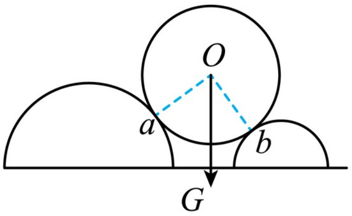
C□□□□□□□□□□□$^{238}_{94}\mathrm{Pu}$□□□□□$^{234}_{92}\mathrm{U}$□□$^{234}_{92}\mathrm{U}$□$^{238}_{94}\mathrm{Pu}$□□□$^{238}_{94}\mathrm{Pu}$□$^{234}_{92}\mathrm{U}$□□□□□□□C□□□

D□□□□□□□□□□□□□□□□□□□□□D□□□

□□C□

6. □□□□□□□□□□□□□□□□□□□G□□□□□□□□□a□b□□□□$\angle aOb=90^\circ$□□□Ob□□□□□□37°□□□

$\sin37^\circ=0.6$□$\cos37^\circ=0.8$□□□□□□□□□F_a□F_b□□□□（　）



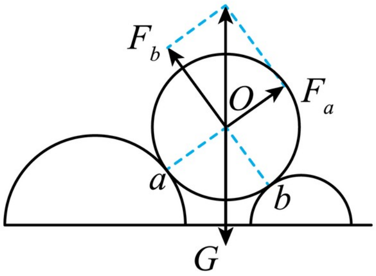
A. $F_a = 0.6G$[illegible]$F_b = 0.4G$　　B. $F_a = 0.4G$[illegible]$F_b = 0.6G$

C. $F_a = 0.8G$[illegible]$F_b = 0.6G$　　D. $F_a = 0.6G$[illegible]$F_b = 0.8G$

[illegible]D

[illegible]

[illegible]



[illegible]

$$F_a = G\sin 37^\circ = 0.6G$$

$$F_b = G\cos 37^\circ = 0.8G$$

[illegible] D[illegible]

7. [illegible] 1100kV [illegible]“[illegible]”[illegible]“[illegible]”[illegible]（　　）

A. [illegible]　　B. [illegible]

C. 1100kV [illegible]　　D. [illegible]

[illegible]A

[illegible]

[illegible]AB[illegible]A [illegible]B [illegible]

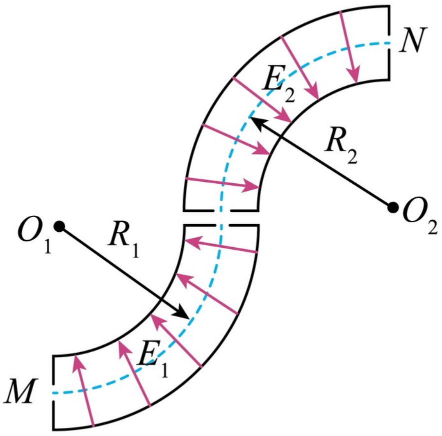
C[illegible]1100kV [illegible]C [illegible]

D[illegible]D [illegible]

[illegible] A[illegible]

8. [illegible]M[illegible]R_1[illegible]R_2[illegible]

N[illegible]E_1[illegible]E_2[illegible]R_1[illegible]R_2[illegible]E_1[illegible]E_2[illegible]（　　）



A. $\frac{E_1}{E_2}=\frac{R_2}{R_1}$　　B. $\frac{E_1}{E_2}=\frac{R_1^2}{R_2^2}$　　C. $\frac{E_1}{E_2}=\frac{R_1}{R_2}$　　D. $\frac{E_1}{E_2}=\frac{R_2^2}{R_1^2}$

□□□□A

□□□□

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$$qE_1=m\frac{v^2}{R_1}$$

$$qE_2=m\frac{v^2}{R_2}$$

□□□□

$$\frac{E_1}{E_2}=\frac{R_2}{R_1}$$

□□A□

9. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□$1:2:4$□□□□□□□T□□□□□□□□□□□□□□□□□r□n□□□□□□□□□□□

□T_0□□□（　）

A. □□□□□□□□$\frac{n}{16}r$　　B. □□□□□□□□$\frac{n}{2}r$

C. □□T□T_0□□□$n^{\frac{3}{2}}$　　D. □□□□□□□□□□□□$\frac{T_0^2}{T^2}n^3$

□□□□D

[illegible]

[illegible] 3 [illegible]

$$r_3 = nr$$

AB[illegible]

$$G\frac{Mm}{R^2} = m\frac{4\pi^2}{T^2}R$$

[illegible]

$$R = \sqrt[3]{\frac{GMT^2}{4\pi^2}}$$

[illegible] $1:2:4$,[illegible]

$$r_1 = \frac{nr}{\sqrt[3]{16}}$$

[illegible]

$$r_2 = \frac{nr}{\sqrt[3]{4}}$$

[illegible] AB [illegible]

C[illegible] T [illegible] T_0 [illegible] C [illegible]

D[illegible]

$$G\frac{M_{[illegible]}m}{(nr)^2} = m\frac{4\pi^2}{T^2}nr$$

$$G\frac{M_{[illegible]}m}{r^2} = m\frac{4\pi^2}{T_0^2}r$$

[illegible]

$$\frac{M_{[illegible]}}{M_{[illegible]}} = \frac{T_0^2}{T^2}n^3$$

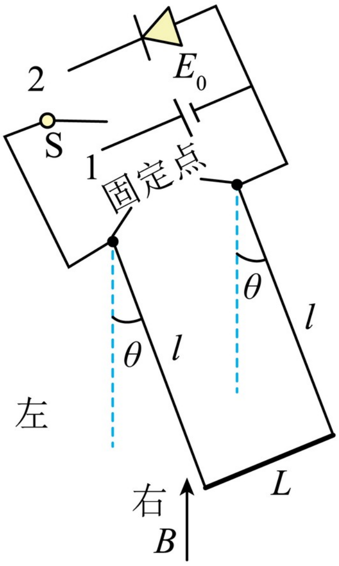
[illegible] D [illegible]

[illegible] D[illegible]

10. [illegible] M[illegible] R[illegible] L [illegible] l[illegible] L[illegible] S [illegible]

□□□□ E_0 □□□□□□□□□□□□□□□□□□□□□□□□ B □□□□□□□□□□□□□□ S □ 1 □□□□□□□

□□□□□□□□ $\theta=\frac{\pi}{4}$ □□□□ S □ 2 □□□□□□□□□□□□□□　□



A. □□□□ $E_0=\frac{\sqrt{2}Mg}{2BL}R$

B. □□□□□ $Q=(1-\frac{\sqrt{2}}{2})Mgl$

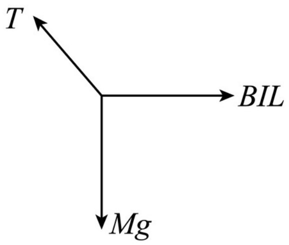
C. □□□□□□□□□□ $\frac{\pi}{4}$

D. □□□□□□□□□□□□

□□□C

□□□

□□□A□□□□ 1 □□□□□□□□□□



□□□□□□

$$Mg=BIL$$

□□

$$I=\frac{Mg}{BL}$$

[illegible]

$$I=\frac{E_0}{R}$$

[illegible]

$$E_0=\frac{MgR}{BL}$$

[illegible] A [illegible]

[illegible]

[illegible]

B[illegible]

$$Q'=(1-\frac{\sqrt{2}}{2})Mgl$$

[illegible]

$$Q<Q'=(1-\frac{\sqrt{2}}{2})Mgl$$

[illegible] B [illegible]

C[illegible] B [illegible] $\frac{\pi}{4}$ [illegible] C [illegible]

D[illegible] B [illegible]

$$E=BLv$$

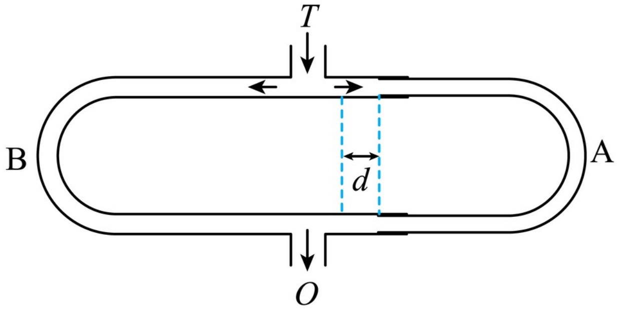
[illegible] D [illegible]

[illegible] C[illegible]

11. [illegible] T [illegible] A[illegible]B [illegible] O [illegible] A[illegible]B [illegible] O [illegible]

[illegible] 400 [illegible] A [illegible] $d=15\text{cm}$ [illegible] O [illegible] 100 [illegible]

[illegible]（　　）



A. □□□□□ $\lambda=15\text{cm}$　　　　B. □□□□□ $\lambda=30\text{cm}$

C. □□□□□□□□□ $3:1$　　　　D. □□□□□□□□□ $2:1$

□□□□C

□□□□

□□□□CD□□□□□A□B □□□□□□□□□□□□□□□A □□□ $d=15\text{cm}$ □□□□□□ O □□□□□□□□□□□□□□□□□20□□□□□□

□□□10□□

$$A_1+A_2=20$$

$$A_1-A_2=10$$

□□□□□□□□□□

$$\frac{A_1}{A_2}=\frac{3}{1}$$

□C □□□D □□□

AB□□□□□□□□□□□□

$$\frac{\lambda}{2}=2d$$

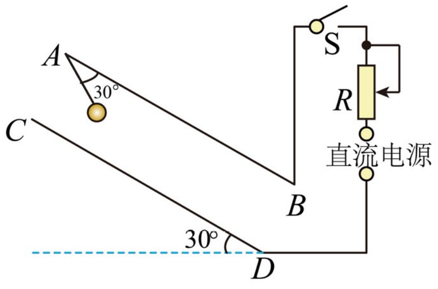
□□

$$\lambda=60\text{cm}$$

□AB □□□

□□C□

12. AB□CD □□□□□□□□□□□□□□□□□□ 30° □□□□□□□□□□□□□□□□□□□□ 10cm □□□□□□ $1.0\times10^{-8}\text{C}$ □□□□□ $3.0\times10^{-4}\text{kg}$ □□□□□□ 5cm □□□□□□□□ A □□□□□□ S□□□□□□□□□□ AB □□□□ 30° □□□□□□□□□□□ CD □□□ M □□□□□□□□□　□



A. MC [illegible] $5\sqrt{3}\text{cm}$

B. [illegible] $\frac{3}{4}\sqrt{3}\times10^{-4}\text{J}$

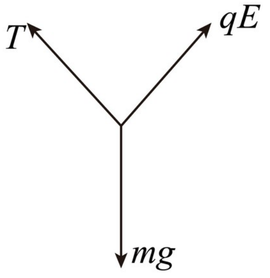
C. [illegible] $\sqrt{3}\times10^{4}\text{N/C}$

D. [illegible] R [illegible] MC [illegible]

[illegible]B

[illegible]

[illegible]A[illegible]



[illegible]

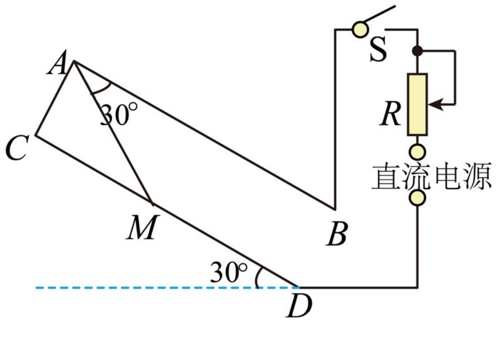
$$T=qE$$

$$T\sin60^{\circ}+qE\sin60^{\circ}=mg$$

[illegible]

$$T=qE=\sqrt{3}\times10^{-3}\text{N}$$

[illegible]



[illegible]

$$L_{MC}=d\tan60^{\circ}=10\sqrt{3}\text{cm}$$

[illegible] A [illegible]

B[illegible]

$$x=(10-5\sin30^{\circ})=7.5\text{cm}$$

[illegible]

$$W_{[illegible]}=-qEx=-\frac{3}{4}\sqrt{3}\times10^{-4}\,\mathrm{J}$$

[illegible] $\frac{3}{4}\sqrt{3}\times10^{-4}\,\mathrm{J}$ [illegible] B [illegible]

C[illegible]

$$E=\frac{qE}{q}=\sqrt{3}\times10^{5}\,\mathrm{N/C}$$

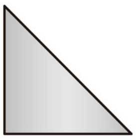
[illegible] C [illegible]

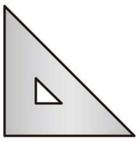
D[illegible] R [illegible] MC [illegible] D [illegible]

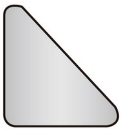
[illegible] B[illegible]

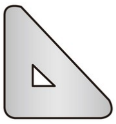
13. [illegible] [illegible] 0.9m[illegible] $n=\frac{4}{3}$ [illegible] $h=\frac{\sqrt{7}}{10}\,\mathrm{m}$[illegible]

[illegible] [illegible]

A 

B. 

C. 

D. 

[illegible]C

[illegible]

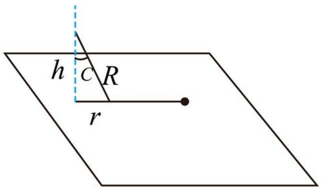
[illegible]

$$\sin C=\frac{1}{n}=\frac{3}{4}$$

[illegible]

$$\tan C=\frac{3}{\sqrt{7}}$$

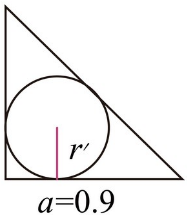
[illegible]



[illegible]

$$r = h\tan C = \frac{\sqrt{7}}{10} \times \frac{3}{\sqrt{7}}\text{m} = 0.3\text{m}$$

□□□□□□□□□□□ $r = 0.3\text{m}$ □□□□□□□□□□□□□□□



□□□□□□□□□□ $r^{'}$ □□

$$\frac{1}{2}a^2 = \frac{1}{2}(a + a + \sqrt{2}a)r^{'}$$

□□

$$r^{'} = \frac{a}{2+\sqrt{2}} < \frac{a}{3} = r$$

□□□□□

□□C□

□□□□Ⅱ□□□2□□□□□3□□□6□□□□□□□□□□□□□□□□□□□□□□□□□□□3□□□□□□□2□□□□□□0□□

14. □□□□□□□　　□

A. □□□□□□□□□□□□

B. □□□□□□□□□□□

C. □□□□□□□□□□□□□□□

D. □□□□□□□□□□□□□□□□□□□□□□

□□□□BD

□□□□

□□□A□□□□□□□□□□□□□□□□□□□□□□□□A□□□

B□□□□□□□□□□□□□B□□□

C□□□□□□□□□□□□□□□□□□□□□□□□□□□□C□□□

D□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□D□□□

□□BD□

15. □□□□□□□□□□□□□ W_0 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□ d □□□□□□□

L [illegible]Δx[illegible] m[illegible] h[illegible] c[illegible]（ ）

A. [illegible]$p_c=\dfrac{hL}{d\Delta x}$

B. [illegible]$E_k=\dfrac{hL^2}{2md^2\Delta x^2}$

C. [illegible]$E=W_0+\dfrac{chL}{d\Delta x}$

D. [illegible]$p=\dfrac{W_0}{c}+\dfrac{h^2L^2}{2cmd^2\Delta x^2}$

[illegible]AD

[illegible]

[illegible]

$$\Delta x=\frac{L}{d}\lambda$$

[illegible]

$$\lambda=\frac{\Delta xd}{L}$$

A[illegible]

$$p_c=\frac{h}{\lambda}$$

[illegible]

$$p_c=\frac{hL}{d\Delta x}$$

[illegible] A [illegible]

B[illegible]

$$E_k=\frac{p^2}{2m}$$

[illegible] A [illegible]

$$E_k=\frac{h^2L^2}{2md^2\Delta x^2}$$

[illegible] B [illegible]

C[illegible]

$$E=W_0+E_k=W_0+\frac{h^2L^2}{2md^2\Delta x^2}$$

[illegible] C [illegible]

D[illegible]

$$p = mc$$

□□□□□

$$E = mc^2$$

□□□□

$$p = \frac{E}{c}$$

□□□□□□

$$p = \frac{W_0}{c} + \frac{h^2L^2}{2cmd^2\Delta x^2}$$

□D□□□

□□AD□

□□□□□□

□□□□□□□□□□5□□□□55□□

16□□□□□Ⅰ□Ⅱ□Ⅲ□□□14□□

16. □“□□□□□□□□□□”□□□

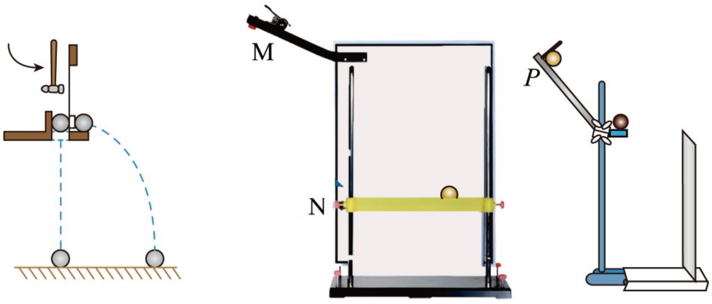


图1　　图2　　图3

□1□□□1□□□□□□□□□□□□□□□□________□

A. □□□□□□□□□□□□□□□□

B. □□□□□□□□□□□□□□□□□

C. □□□□□□□□□□□□□□□□□□□□

□2□□□2□□□□□□□□□□□□□□□□________□

A. □□□□M□□□□□□□□□□

B. □□□□□□□N□□□□□□□□□□

C. □□□□□□□M□□□□□□□□□

□3□□□3□□P□□□□□□□□

□□□□□□0□□□□□□□□□□□□x□□□□□□□□□□□□□1□2□3□4□□□0□□□□□□□□□□□□□□□□y□□□□□□□□□□

y_1□y_2□y_3□y_4□□□□□□□□d□□□□□□□□□v_0□________□

A. $(x+\frac{d}{2})\sqrt{\frac{g}{2y_1}}$　　B. $(x+\frac{d}{2})\sqrt{\frac{g}{y_2-y_1}}$　　C. $(3x-\frac{d}{2})\sqrt{\frac{g}{2y_4}}$　　D. $(4x-\frac{d}{2})\sqrt{\frac{g}{2y_4}}$

[illegible]　①. B　②. C　③. D

[illegible]

[illegible]1[illegible][1]AC[illegible]1 [illegible]AC [illegible]

B[illegible]B [illegible]

[illegible]B[illegible]

[illegible]2[illegible][2]AC[illegible]A [illegible]C [illegible]

B[illegible]N [illegible]B [illegible]

[illegible]C[illegible]

[illegible]3[illegible][3]A[illegible]

$$y_1=\frac{1}{2}gt^2$$

[illegible]

$$x-\frac{d}{2}=v_0t$$

[illegible]

$$v_0=(x-\frac{d}{2})\sqrt{\frac{g}{2y_1}}$$

[illegible]A [illegible]

B[illegible]

$$\Delta y=y_2-2y_1=gt^2$$

[illegible]

$$x=v_0t$$

[illegible]

$$v_0=x\sqrt{\frac{g}{y_2-2y_1}}$$

[illegible]B [illegible]

CD[illegible]

$$y_4=\frac{1}{2}gt^2$$

□□□□

$$4x-\frac{d}{2}=v_0t$$

□□□□

$$v_0=(4x-\frac{d}{2})\sqrt{\frac{g}{2y_4}}$$

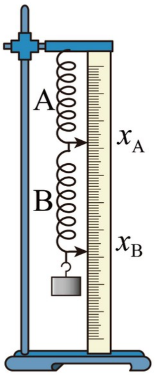
□D□□□C□□□

□□D□

17. □□□□□□□□□A□B□□□□□□□□□□□□□□□□□A□B□□□□□□□□□□□□□□□B□□□□□□□□□□□□m□□□□□□□□□□□□

□x_A□x_B□□□□□□

□□□□	1	2	…	
x_A/cm	7.75	8.53	9.30	…
x_B/cm	16.45	18.52	20.60	…



□□□□□2□□□□A□□□□$\Delta x_A=$________cm□□□B□□□□$\Delta x_B=$________cm□□□□□□□□□□□□□ΔE_p________

$mg(\Delta x_A+\Delta x_B)$□□□“=”□“<”□“>”□□

□□□□　①. 0.78　②. 1.29　③. >

□□□□

□□□□[1]□□□□□2□□□□A□□□□

$$\Delta x_A=8.53cm-7.75cm=0.78cm$$

[2]□□B□□□□

$$\Delta x_B = 18.52cm - 16.45cm - 0.78cm = 1.29cm$$

[3]□□

$$\Delta E_p > mg(\Delta x_A + \Delta x_B)$$

18. □“□□□□□□□□□□□□”□□□

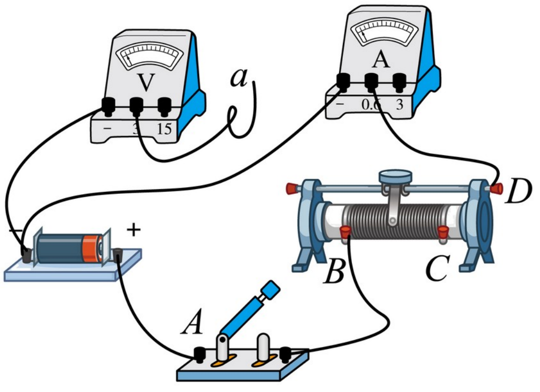


图1

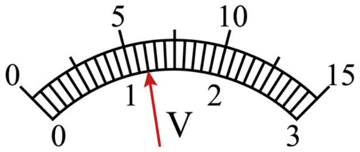


图2

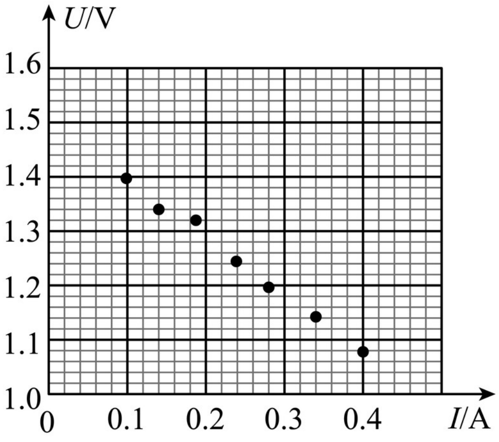


图3

□1□□□□□□1□□□□□ a □□□□□________□□□“A”□“B”□“C”□“D”□□□□□□□□□□□□□□□□□□□□□□□□□□2□□□□□□□________V□

□2□□□□7□□□□□□□3□□ $U-I$ □□□□□□□□□□□□□□□□ $E=$ ________V□□□ $r=$ ________Ω□□□□□□□□□□□

□□□□

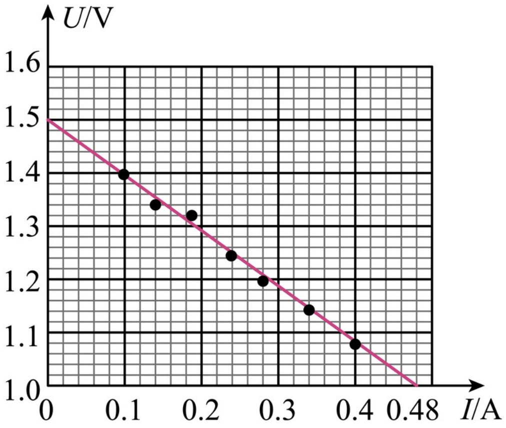
□□□□ ①. B ②. 1.20 ③. 1.50 ④. 1.04

□□□□

□□□□1□[1]□□ a □□□□□ B □□

[2]□□□□□□□□1.5V□□□□□□ $0-3V$ □□□□□□□0.1V□□□□□□□□□□1.20V□

[illegible]2[illegible][3][4][illegible] $U-I$ [illegible]



[illegible]

$$U=E-Ir$$

[illegible]

$U-I$ [illegible]

$$E=1.50\text{V}$$

$U-I$ [illegible]

$$r=\frac{1.50-1.00}{0.48-0}\Omega=1.04\Omega$$

19. [illegible]

A. “[illegible]”[illegible]

B. “[illegible]”[illegible]

C. “[illegible]”[illegible]“[illegible]”[illegible]

D. “[illegible]”[illegible]“[illegible]”[illegible]10V[illegible]

[illegible]CD

[illegible]

[illegible]A[illegible]“[illegible]”[illegible]A[illegible]

B[illegible]“[illegible]”[illegible],[illegible]

[illegible]B[illegible]

C[illegible]“[illegible]”[illegible]“[illegible]”[illegible]C[illegible]

D[illegible]“[illegible]”[illegible]“[illegible]”[illegible]10V[illegible]

[illegible]D[illegible]

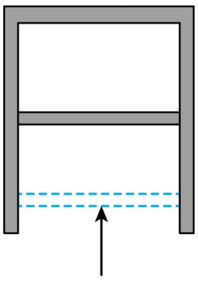
[illegible]CD[illegible]

20. □□□□□□□□□□□□□□□□ $S=100\text{cm}^2$ □□□ $m=1\text{kg}$ □□□□□□□□□□□□□□□□□□□□□□□□ 300K

□□□□□□□□□□□□□□□ A □□□ $V_A=600\text{cm}^3$ □□□□□□□□□□□ B □□□□ $V_B=500\text{cm}^3$ □□□□□□□□□□□

□□□□□ C □□□□ $p_C=1.4\times10^5\ \text{Pa}$ □□□□□ A □□□ C □□□□□□□□□ $Q=14\text{J}$ □□□□ B □□□ C □□□□□□

$\Delta U=25\text{J}$ □□□ $p_0=1.01\times10^5\ \text{Pa}$ □



□1□□□□□ A □□□ B □□□□□□________□□□“□□”□“□□”□“□□”□□□□□□□□□□ □□________□□□“□□”□“□

□”□“□□”□□

□2□□□□□□ C □□□ T_c □

□3□□□□□□ A □□□ B □□□□□□□□□ W □

□□□□□1□□□□□□□2□350K□□3□11J

□□□□

□□□□1□□□□□□□□□□□□ A □□□□□□□ B □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□

□2□□□ A □ □□

$$p_A=p_0-\frac{mg}{S}=1.0\times10^5\ \text{Pa}$$

□□ T_A=300K□□□ V_A=600cm^3□

C □□□ $p_C=1.4\times10^5\ \text{Pa}$ □□□ V_C=500cm^3□

□□

$$\frac{p_AV_A}{T_A}=\frac{p_CV_C}{T_C}$$

□□

$$T_C=350K$$

□3□□ B □ C □□□□□□□□□□ $W_{BC}=0$□□□ B □ C □□□□□□ 25J □□□□□□□□□□ 25J□□□□□ A □ C □□□□□ 14J□□□□□□ A □ B □□□□ 11J□□ A □ B □□□□□□□□□□ A □ B □□□□□□□ 11J□

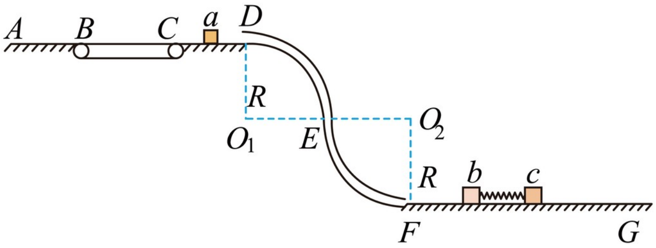
21. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ AB□CD □□□□□□□□□□□□□□□□□□ $R=0.4m$ □□□□□□□□□□□

□□□□□□ DEF □□□ CD □□□□□□□□□□ FG □□□□□□□□□□ $3m$ □□□ b □□□□ $2m$ □□□ c □□□□□ $k=100N/m$ □□

□□□□□□□□□□□ FG □□□□□□ $m=0.12kg$ □□□ a □□□□ $v_0=2\sqrt{21}m/s$ □ D □□□□□ DEF □□□□□ FG □□□□ b □

□□□□□□□□□□□□□□ $L=0.8m$ □□ $v=2m/s$ □□□□□□□□□□□ a □□□□□□□□□□□ $\mu=0.5$ □□□□□□□□□□□□□□□□

□□□□□□□□□□□□□ $E_p=\frac{1}{2}kx^2$ □x□□□□□□



□1□□□□ a □□□□□□ DEF □□□ F □□□□□ v_F□□□□□□□□ F_N□

□2□□□□ a □□□□□ B □□□□ $v_B=1m/s$ □□□□ a□b □□□□□□□□□□□ ΔE□

□3□□□□ a □□□□ b □□□□□□□□□□□□□□□□□□□□□□□ Δx □

□□□□□1□10m/s□31.2□□2□0□□3□0.2m

□□□□

□□□□1□□□ a □ D □ F □□□□□□

$$mg\cdot 2R=\frac{1}{2}mv_F^2-\frac{1}{2}mv_0^2$$

□ F □

$$F_N-mg=m\frac{v_F^2}{R}$$

□□

$$v_F = 10\text{m/s}$$

$$F_N = 31.2\text{N}$$

□2□□□ a □□ B □□□□□ $v_B = 1\text{m/s}$□□□ a □□□□□□□□□□□□□□□□

$$a = \mu g = 5\text{m/s}^2$$

□□

$$v_B^2 = v_C^2 - 2aL$$

□□□ C □□□□

$$v_C = 3\text{m/s}$$

□□□ a □□□□□□□ C □

$$\frac{1}{2}mv_1^2 = \frac{1}{2}mv_C^2 + mg\cdot 2R$$

□□

$$v_1 = 5\text{m/s}$$

□ ab □□□□□□□□

$$mv_F = -mv_1 + 3mv_2$$

□□□□ b □□□

$$v_2 = 5\text{m/s}$$

□□□□□□□□

$$\Delta E = \frac{1}{2}mv_F^2 - \frac{1}{2}mv_1^2 - \frac{1}{2}\cdot 3mv_2^2 = 0$$

□3□□□□ a □□□□ b □□□□□□□ ab □□□□□□□

$$mv_F = 4mv$$

□□

$$v = 2.5\text{m/s}$$

□□□□□□□□□□□□□□□□□□□□□□

$$4mv = 6mv'$$

□

$$v' = \frac{5}{3}\text{m/s}$$

[illegible]x_1[illegible]

$$\frac{1}{2}\cdot 4mv^2=\frac{1}{2}\cdot 6mv'^2+\frac{1}{2}kx_1^2$$

[illegible]

$$x_1=0.1\text{m}$$

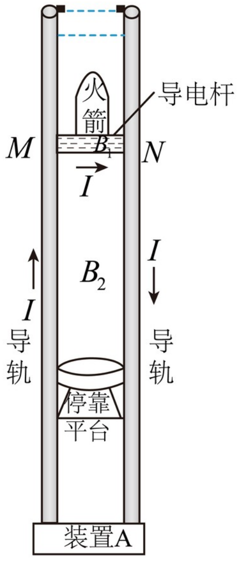
[illegible]

$$x_2=x_1$$

[illegible]

$$\Delta x=2x_1=0.2\text{m}$$

22. [illegible] MN [illegible] A [illegible] A [illegible] I [illegible] I [illegible] $B_1=kI$ [illegible] k [illegible] $B_2=2kI$ [illegible] B_1 [illegible] v_0 [illegible] M [illegible] $d=\dfrac{3Mg}{kI^2}$ [illegible] R [illegible] A [illegible]



[illegible]1[illegible]F[illegible]L[illegible]

[illegible]2[illegible]E[illegible]t[illegible]

□3□□□□A□□□□U□□□□□t□□□□□□□□□W□

□4□□R□□□□□0□□□A□□□□□□□□□□□A□□□□□□□□□□□□

□ □ □ □ □ 1 □ 3Mg □ $\frac{v_0^2}{4g}$□ □ 2 □ $E=\frac{6Mg}{I}(v_0-2gt)$□ □ 3 □ $U=\frac{3Mg}{I}(v_0-2gt)+IR$□

$W=3Mg(v_0t-2gt^2)+I^2Rt$□□4□□□A□□□□□□□□□□□□□□$\frac{3}{4}Mv_0^2$

□□□□

□□□□1□□□□□□□□

$$F=B_1Id=3Mg$$

□□□□□□□□□□□□□□□□□

$$Mg-F=Ma$$

□□

$$a=-2g$$

□□□□□□□□

$$L=\frac{0-v_0^2}{2a}=\frac{v_0^2}{4g}$$

□2□□□□□□□

$$E=B_2dv$$

□□

$$v=v_0+at$$

□□

$$E=\frac{6Mg}{I}(v_0-2gt)$$

□3□□□□□□

$$UI=Fv+I^2R$$

□□

$$v=v_0+at$$

□□

$$U=\frac{3Mg}{I}(v_0-2gt)+IR$$

□□□□

$$W=IUt=3Mg(v_0t-2gt^2)+I^2Rt$$

□4□□□A□□□□□□□□□□□□□□□□□□□□□□v_0□□□□□□□□□□

$$E'=\frac{1}{2}Mv_0^2+MgL=\frac{3}{4}Mv_0^2$$

23. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□Oxy□□□□□□□□□□□□□□□□□□□□□L□□□□□□x□□□□Ⅰ□Ⅱ□□□□□

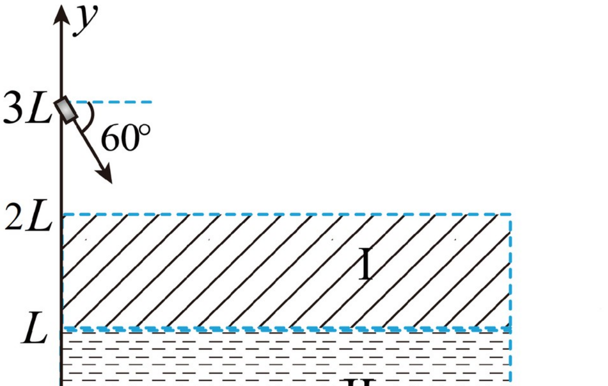
□□□□□□□□□□B_1□□□□□□□□Ⅱ□□□□□□□□□□B_2□□□□□□□□□□□□□□□□Ⅱ□□□□□x□□□□□□$(0,3L)$□□□□□□□□□

□□□m□□□□□q□□□□□□x□□□□$60°$□□

□1□□□□□□□□□Ⅱ□□□□□v_1□□□□□□□□□□□t□

□2□□$B_2=2B_1$□□□□□$y=\frac{L}{2}$□□□□□□□□□v_2□

□3□□$B_2=\frac{B_1}{L}y$□□□□□□□□□□□□□□□□□□□□□□$\frac{B_1qL}{m}\sim\frac{6B_1qL}{m}$□□□□□□□□□□□□□□□□□□□□□$\eta$□



□□□□□1□$v_1=\frac{2B_1qL}{m}$□$t=\frac{2\pi m}{3qB_1}$□2□$v_2=\frac{4B_1qL}{m}$□3□60%

□□□□

□□□□□1□□□□□□□□□□□□□Ⅱ□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$$r_1\cos 60^\circ=r_1-L$$

解得

$$r_1=2L$$

又因

$$qv_1B_1=m\frac{v_1^2}{r_1}$$

解得

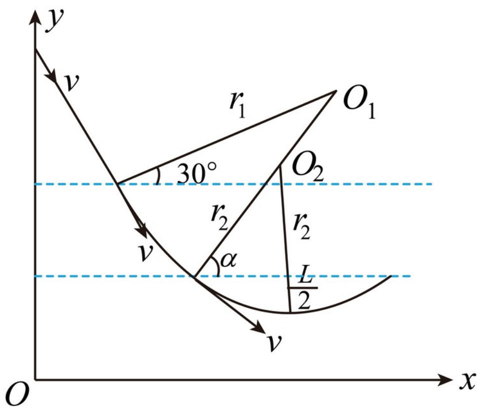
$$v_1=\frac{2B_1qL}{m}$$

粒子运动的周期满足

$$T=\frac{2\pi m}{qB_1}$$

运动时间

$$t=\frac{2\times 60^\circ}{360^\circ}T=\frac{2\pi m}{3qB_1}$$



（2）由 $B_2=2B_1$，又因

$$r=\frac{mv}{qB}$$

解得

$$r_1=2r_2$$

由几何关系知，粒子运动圆心在 O_1O_2 连线上，设偏转角 α，几何关系得

$$r_1\sin\alpha-r_1\sin 30^\circ=L$$

$$r_2 - r_2\sin\alpha = \frac{L}{2}$$

[illegible]

$$r_2 = 2L$$

$$\sin\alpha = \frac{3}{4}$$

[illegible]

$$qv_2B_2 = m\frac{v_2^2}{r_2}$$

[illegible]

$$v_2 = \frac{4B_1qL}{m}$$

[illegible]3[illegible]Ⅱ[illegible] x [illegible]

$$B_2qv_y\Delta t = m\Delta v_x$$

[illegible]

$$\frac{B_1}{L}yq\Delta y = m\Delta v_x$$

[illegible]

$$\sum\frac{B_1}{L}yq\Delta y = \sum m\Delta v_x$$

[illegible]Ⅰ[illegible]Ⅱ[illegible] x [illegible]

$$m(v - v\cos 60^\circ) = B_1qL + \frac{B_1}{L}\cdot\frac{0+L}{2}\cdot qL$$

[illegible]

$$v = \frac{3B_1qL}{m}$$

[illegible] $\frac{3B_1qL}{m}$ ~ $\frac{6B_1qL}{m}$ [illegible] $\frac{B_1qL}{m}$ ~ $\frac{6B_1qL}{m}$ [illegible]

[illegible]

$$\eta = 60\%$$